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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/501,723	07/15/2004	Ulrich Bast	2001P21301WOUS	4374

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Siemens Corporation
Intellectual Property Department
170 Wood Avenue South
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EXAMINER

HANAN, DEVIN J

ART UNIT	PAPER NUMBER
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3745

DATE MAILED: 03/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/501,723

Applicant(s)

BAST ET AL.

Examiner

Devin Hanan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-30 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 12-30 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7/15/04 & 8/19/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 23 is rejected under 35 U.S.C. 102(b) as being anticipated by Stahl (U.S. Patent 4,111,603).

Stahl discloses a turbine blade (20) with a root portion connected to a rotor disk (18); and a tip portion (airfoil 22) having a first section (20% of length of airfoil 22 next to root 40) located adjacent to the root portion (40) and a second section (radially outer 80% of the airfoil portion 22) located adjacent to the first section consisting exclusively of a ceramic material and extending at least 80% of the length of the tip portion (the entire blade is ceramic, col. 1 lines 46-54).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stahl in view of the applicants' admitted prior art.

Regarding claim 24, Stahl discloses a turbine blade comprised of a ceramic material.

Stahl does not disclose that at least 40% by volume of the material has a density of at most 4 g/cm^3 .

However, applicants' admitted prior art (specification page 4 paragraph 27 lines 1-2) teaches that the density for ceramics falls in the range of 1.5 and 3.5 g/cm^3 .

Since Stahl and the applicants' admitted prior art are both ceramic turbine blades, the information disclosed by the applicants' admitted prior art would have been well known to Stahl. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the blade of Stahl out of ceramic material that has the commonly known density of between 1.5 and 3.5 g/cm^3 as taught by the applicants' admitted prior art.

Regarding claim 26, the modified apparatus of Stahl discloses all of the claimed limitation as discussed in claims 23 and 24 above.

Claims 12-16, 19-20, 25, and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stahl in view of applicants' admitted prior art and further in view of Morrison (U.S. Patent 6,514,046).

The modified apparatus of Stahl discloses all of the claimed limitations as discussed in claim 24 above, and a root portion (the root portion 26 which attaches to the disc 18 is metallic, col. 2 lines 50-60), a platform portion, an airfoil portion.

The modified apparatus of Stahl does not disclose that the blade (blade 22 is all ceramic) is made of a plurality of materials.

However, Morrison et al. teaches of an airfoil made of a plurality of materials with a metallic core to bear "almost all mechanical loading including aerodynamic loading, during operation" (col. 4 lines 4-6).

Since Stahl, as modified, and Morrison et al. are both ceramic turbine blades, the purpose discloses by Morrison et al. would have been recognized in the pertinent prior art of Stahl. At the time invention was made, it would have been obvious to one having ordinary skill in the art to add the metal core of Morrison et.al. along the length of the entire blade of Stahl for the purpose of improving capabilities to withstand the mechanical loading (col. 4 lines 4-6).

Regarding claim 13, the modified apparatus of Stahl discloses all of the claimed limitations as discussed in claim 12 above and the rotor disk is metallic (18, col. 2 lines 50-55).

Regarding claim 14, the modified apparatus of Stahl discloses all of the claimed limitations as discussed in claim 12 above, but does not disclose the metallic core is surrounded by a structural ceramic material.

However, Morrison et al. teaches of a metallic core surrounded by a structural ceramic material that is strain tolerant (the inner layer 46 is structural, col. 4 line 24) to

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bear the part of the mechanical load that the metallic core does not (metallic core does not bear all the mechanical loading so the strain tolerant ceramic layer must bear some load, col. 4 lines 4-6) and the ceramic material will bear the thermal load (abstract).

Since Stahl, as modified, and Morrison et al. are both ceramic turbine blades, the purpose disclosed by Morrison et al. would have been recognized in the pertinent prior art of Stahl. At the time invention was made, it would have been obvious to one having ordinary skill in the art to make use the structural ceramic of Morrison et al. in the blade of Stahl for the purpose of bearing some of the thermal load and the mechanical load (abstract and col 4. line 24).

Regarding claim 15, the modified apparatus of Stahl discloses all of the claimed limitations as discussed in claim 14 above, but does not disclose the metallic core is formed at least in part from a metallic foam.

However, Morrison et al. teaches of the metallic core being formed at least in part by metallic foam to allow cooling fluid to pass through to contact the ceramic shell (col. 4 lines 52-54).

Since Stahl, as modified, and Morrison et al. are both ceramic turbine blades, the purpose disclosed by Morrison et al. would have been recognized in the pertinent prior art of Stahl. At the time invention was made, it would have been obvious to one having ordinary skill in the art to make use the metallic foam of Morrison et al. in the blade of Stahl for the purpose of allowing cooling fluid to pass through to contact the ceramic shell (col. 4 lines 52-54).

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Regarding claim 16, the modified apparatus of Stahl discloses all of the claimed limitations as discussed in claim 12 above, but does not disclose a non structural ceramic protective layer arranged over the ceramic material.

However, Morrison et al. teaches of a non-structural protective ceramic layer over the ceramic material to serve as the high temperature insulating ceramic (col. 4 lines 30-33).

Since Stahl, as modified, and Morrison et al. are both ceramic turbine blades, the purpose discloses by Morrison et al. would have been recognized in the pertinent prior art of Stahl. At the time invention was made, it would have been obvious to one having ordinary skill in the art to add the non-structural protective ceramic layer of Morrison et al. to the blade of Stahl for the purpose of serving as the high temperature insulating ceramic (col. 4 lines 30-33).

Regarding claim 19, the modified apparatus of Stahl discloses all of the claimed limitations as discussed in claims 14 and 15 above (metal layers 50 and 52).

Regarding claim 20, the modified apparatus of Stahl discloses all of the claimed limitations as discussed in claims 14 and 16 above (inner layer 46 and outer layer 44 are both ceramic).

Regarding claim 25, the modified apparatus of Stahl discloses all of the claimed limitations as discussed in claims 14 and 15 above (metal layers 50 and 52).

Regarding claim 28, the modified apparatus of Stahl discloses all of the claimed limitations as discussed in claim 14 above

Regarding claim 29, the modified apparatus of Stahl discloses all of the claimed limitations as discussed in claim 15 above

Regarding claim 30, the modified apparatus of Stahl discloses all of the claimed limitations as discussed in claim 16 above.

Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stahl in view of applicants' admitted prior art and further in view of Morrison.

Stahl, as modified in the rejection of claim 12 above, discloses all of the claim limitations, but does not disclose expressly that the blades are 50 or 65 cm long. Instead, Stahl does not indicate any certain length of the blades.

At the time the invention was made, it would have been an obvious matter of design choice to a person of ordinary skill in the art to the blades of Stahl to be at least 50 or 65 inches long because Applicant has not disclosed that the lengths provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Stahl's blade, and applicant's invention, to perform equally well with either the length of an ordinary turbine blades, such as Stahl, or the claimed at least 50 or 65 cm length because both spacing dimensions would perform the same function of interacting with the main flow equally well considering the typical size of a turbine blade.

Therefore, it would have been prima facie obvious to modify Stahl to obtain the invention as specified in claims 17 and 18 because such a modification would have

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been considered a mere design consideration which fails to patentably distinguish over the prior art of Stahl.

Claims 21 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stahl in view of applicants' admitted prior art and Morrison et al. and further in view of Brennan et al. (U.S. Patent 4,324,843).

The modified apparatus of Stahl discloses all of the claimed limitations as discussed in claim 12 above, but does not disclose the material with the density of at most 4 g/cm^3 is a carbon containing material.

However, Brennan et al. teaches that low density ceramics can contain silicon carbide fiber for the purpose of reinforcement (abstract, formula is in col. 2 line 37, density is in col. 3 line 7).

Since Stahl, as modified, and Brennan et al. are both ceramic turbine blades, the purpose disclosed by Brennan et al. would have been recognized in the pertinent prior art of Stahl. At the time invention was made, it would have been obvious to one having ordinary skill in the art to use silicon carbide fibers of Brennan in the modified apparatus for the purpose of reinforcement (abstract, formula is in col. 2 line 37, density is in col. 3 line 7).

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stahl in view of applicants' admitted prior art and Morrison et al. and further in view of Klingels (U.S. Patent 4,876,849).

The modified apparatus of Stahl discloses all of the claimed limitations as discussed in claim 12 above, but does not disclose the turbine is at least located in the fourth row of a rotor blade ring of a turbine.

However, Klingels teaches of mounted ceramic blades later stages in multistage turbines to alleviate the need for extensive blade cooling systems (col. 2 lines 19-43).

Since Stahl, as modified, and Klingels are both ceramic turbine blades, the purpose disclosed by Klingels would have been recognized in the pertinent prior art of Stahl. At the time invention was made, it would have been obvious to one having ordinary skill in the art to use the blades of modified apparatus of Stahl in later stages of turbines for the purpose of alleviating the need for extensive blade cooling systems (col. 2 lines 19-43).

Prior Art

The patent to Wang et al. (U.S. Patent 5,720,597) was cited for its teaching of metal foam being used in turbine blades (col. 3 lines 15-23).

The patent to Fritsch et al. (U.S. Patent 4,063,955) was cited for its teaching of some densities of common ceramics used in turbine engine components (abstract and table 3).

The patent to Steibel et al. (U.S. Patent 6,280,550) was cited for its teaching of the use of silicon carbide fibers in a ceramic composite matrix (col. 2 lines 8-23).


The patent to Doi et al. (U.S. Patent 6,206,634) was cited for its teaching of turbine blades of lengths well beyond 50 and 65 cm (abstract).


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Devin Hanan whose telephone number is 571-272-6089. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Look can be reached on 571-272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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3/20/06